occupy the first place for some time to come, so far as elementary education is concerned.

The second lecture deals with the work of Maggi and the morphology of the cranial bones. This is a subject on which Dr. Frassetto has himself published some valuable studies. He would have done well to indicate in his lecture that some, at any rate, of the new views on the number of centres of ossification are based on what seems to be an unduly small collection of cases. The third lecture treats of de Giovanni and his work in clinical anthropology, which deals with a patient according to his morphological characteristics rather than as an individual. Finally, we have a sketch of the work of Lombroso on criminality and genius. Dr. Frassetto insists on the need for scientific treatment of criminals, especially those of the habitual class.

It goes without saying that in brief studies of this sort we only find the broad outlines, without qualification or hint of difficulties, and herein lies perhaps a certain danger for the unfledged anthropologist who attends the academic courses. The book is, however, readable, and offers an example to English anthropologists who wish to interest a larger public.

N. W. T.

Catalogue of the Lepidoptera Phalaenae in the British Museum. Vol. v. Catalogue of the Noctuidæ in the Collection of the British Museum. By Sir George F. Hampson, Bart. Pp. xvi+634; pls. lxxviii–xcv. (London: Printed by Order of the Trustees, 1905.)

We congratulate the authorities of the British Museum and the indefatigable author on the steady progress of this important work, of which a fresh volume appears, with almost clockwork regularity, every two years. The present volume is the second devoted to the Noctuidæ, and contains the second subfamily, the Hadeninæ. These are much less showy moths than those dealt with in the first three volumes of the series, and are more subdued in their colouring; but they are perhaps more interesting to British entomologists, for the family is fairly well represented in the northern hemisphere, although in a work devoted to the moths of the whole world, British, or indeed European, species are few and far between. The work is profusely illustrated, the descriptions are full but not too lengthy, and short notices of larvæ, where known (some of which are here published for the first time), have been included. The keys to the genera and the tables of species will also be found very useful by working entomologists. A table of the phylogeny of the 78 genera into which the author divides the Hadeninæ is given on p. 2, but without comment, which we think is wise, for such tables, in the present state of our knowledge, can only be tentative; and comments on the supposed affinities of genera have often a tendency to become too dogmatic.

Synonymy cannot, of course, be given in full in a work of this character, but in the case of European species, which are most burdened with it, the necessity for further details is largely obviated by a reference to Staudinger's last catalogue; still, we think that, in the case of the few British species, Barrett's "Lepidoptera of the British Islands" might have been referred to.

We heartily commend this important book to the working entomologists of all countries. Five volumes have already appeared, but if it is ever completed it will certainly far exceed in bulk the twenty-seven volumes of the "British Museum Catalogue of Birds." Hitherto it has been wholly the work of one man, and we hope that when he finally lays down his pen, a very large proportion of the gigantic task of describing the moths of the world will have been accomplished by his hands.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Spinthariscope and Retinal Excitability.

I have recently been making a series of observations upon retinal excitability, and have used, among other test stimuli, the well known flashing scintillations of a pocket spinthariscope. The special value of the instrument in this connection is the subminimal or minimal intensity of the retinal excitation judged by the disappearance or appearance of visual sensation. The method used by physiologists for ascertaining whether any given condition alters the excitability of a tissue is that of stimulating periodically the tissue by subminimal or minimal exciting agencies under constant conditions and then changing one of these conditions; if, as the result of such change, the subminimal or inadequate stimulus becomes adequate, the excitability of the tissue has been raised by the change; if, on the other hand, the minimal or adequate stimulus becomes inadequate, then the excitability of the tissue has been lowered by the change.

It is well known that with the ordinary pocket spinthariscope no luminous effects are seen unless the eye has been rendered sufficiently sensitive by some minutes' darkness; this is especially the case during the daytime, the effects at night being almost instantaneously visible. The stimulation of the retina by the scintillating flashes is thus of the minimal order, and becomes subminimal when the eye is exposed to daylight.

It is thus possible to place the eye under different conditions, and to determine by means of the visibility of the flashes in the spinthariscope whether the retinal excitability has been raised or lowered; the method has the merit of great simplicity, all that is necessary being to go into a dark room and immediately look through the instrument; the time necessary for the appearance of the first visible luminosity and for the full appearance of the flashes is longer the lower the general excitability of the retina.

A further point of physiological interest is brought out by simple experiments along these lines. It is well known that when the eyes at night look at groups of stars, faint groups not in the direct line of vision are distinctly seen which disappear when the gaze is directed towards them. There is an accumulating mass of evidence that this familiar experience is the sensory aspect of a modified condition of the retina, the modification consisting in an augmented excitability of the peripheral portions of the retina. It appears probable that such peripheral augmented excitability is localised particularly in the outer segments of one set of retinal elements, the rods, which contain the visual purple discovered by Kühne. The rods are extremely numerous in the peripheral region, and constitute the sole elements in nocturnal birds such as the owl. The visual purple of the rods is blanched by light, especially by the more actinic rays, but the blanching disappears with darkness, and this re-constitution of the substance is associated with the presence of the choroidal pigment. There is thus an adaptation process which renders the dark-adapted eye more excitable than it otherwise would be, and this augmented excitability is especially prominent in that part of the retina which contains large quantities of rods, viz. the peripheral portions. The specialised elements of the central part of the retina (macula lutea) consist in man almost entirely of cones; it is undoubted that in daylight this part is the most excitable region, and that it possesses to a remarkable degree the capacity of localised response, thus enabling two sources of light to be discriminated as distinct when so near together that they subtend an extremely small angle. At night, or with the dark-adapted eye, the whole condition is modified, and the peripheral part of the retina has its excitability augmented more than the central part, so that sources of light of subminimal intensity for the latter are adequate to excite the former; these facts are readily demonstrable by means of the spinthariscope.

Thus if in the day time the observer takes the spin-

thariscope into a dark room he will notice that the first visible effect is a slight general luminosity when the visual gaze is directed down the optical centre of the little tube. If, however, the gaze is shifted to the side of the tube, the whole spinthariscopic display with its scintillating flashes becomes distinctly visible. On opening the door of the dark room and going into the daylight the subsidence of the central and peripheral responses can be followed, whilst on returning to the dark room the re-appearance, first peripheral and then central, can be observed with great distinctness. The essential difference between the light-adapted eye and the dark-adapted eye is thus readily demonstrable, and the rapidity, as well as the efficiency, of such adaptations can be easily followed if the eye is subjected to appropriate periods of darkness and of light.

It is evident that with such a minimal test the influence of a large number of other conditions may be investigated. Without going into these, I may mention one of considerable interest. If the observing eye is kept in the dark-adapted stage by means of a removable bandage, whilst the other eye is subjected to periods of darkness followed by daylight illumination, then the visible effects in the dark room still indicate modification. In my own case illumination of one eye causes a distinct lowering of the retinal excitability of the other one, this being especially characteristic of the peripheral region of the retina. In this connection it should be remembered that the pigment cells alter in the frog as the result of illumination, and that this alteration has been shown by Engelmann and v. Gendre to occur when, the eyes being kept dark, the skin of the frog is illuminated; one eye thus influences the other. The spinthariscope with its constant minimal excitation affords a means of demonstrating this consensual effect. It appears to me that with slight modifications the instrument may become of considerable clinical value. For clinical use it has the merit of being portable and easily used. It furnishes, with no apparent decrease through time, use, &c., a constant and continually recurring stimulus which is of threshold exciting value. It can be easily applied to either the central or peripheral portions of the visual field, and gives indications which are comparable with each other, and are only altered through alterations in retinal excitability. No doubt it can be modified in form so as to be still more useful from the clinical point of view, but even in the form in which, as a scientific toy, it is now presented, its use will show whether the central or peripheral retinal excitability is abnormal, and I anticipate that before any changes can be observed with the ophthalmoscope, it will be possible by its means to ascertain alterations in retinal excitability in the early stages of disease. FRANCIS GOTCH.

Physiological Laboratory, Oxford, June 10.

Solar Changes and Weather.

IN NATURE of June 8 (p. 129) Dr. Lockyer says:—"*Up to the present time*" (italics mine) "those who have been attempting to explain variations of weather on the supposition of solar changes have been looking for the effect of solar action as either increasing or decreasing simultaneously the rainfall over the whole earth."

This is, I think, somewhat inaccurate. The possibility of a given phase of solar change being causally related to opposite weather conditions in different regions has been recognised by many, if I mistake not, for a considerable time. I might instance M. Angot, who expressly affirms it in his "Traité de Météorologie," published a few years ago; and what he there says on the subject indicates a certain currency of the idea previously, of which (no doubt increasing) currency back volumes of NATURE and other serials give evidence. The idea of a barometric see-saw in Asiatic regions, connected with sun-spots, was discussed in NATURE so far back as the 'seventies, if I remember rightly. A. B. M.

WITH regard to Mr. A. B. M.'s remarks above, may I, in the first place, mention that I am familiar with some of the meteorological researches of such high authorities as Chambers, Meldrum, Blandford, Eliot, Hann, Angot, &c., but still there seems to be a tendency for the solar changes, that is, changes indicated by sun-spots, to be considered as affecting the whole earth simultaneously at any one epoch. It would have been more correct for me to have written "Up to the present time many of those who have, &c.," than "Up to the present time those who have, &c.," but at the time of writing I was considering more the generally conceived impression as to the relation between sun-spots and meteorological changes than the results of investigation of any particular region on the earth's surface.

To take a case in point, two years ago M. Charles Nordmann (*Comptes rendus*, vol. cxxxvi., p. 1047, May 4, 1903) communicated to the Paris Academy of Sciences a paper entitled "La Période des Taches solaires et les Variations des Températures moyennes annuelles de la Terre." This title implied that the solar changes were affecting the whole earth similarly, but the investigation was only restricted to the equatorial regions, where the conditions are most favourable for such an inquiry. Further, I am inclined to think that the result he obtained will be found to apply only to that portion of this equatorial belt lying between about longitude 40° E. and 140° E. The reason for this is that out of the thirteen stations in all which he employed, eight were included in this region (five stations of which were given double the weight of the others), and only five were situated in the other part of the belt. If it were possible to include more stations in the western hemisphere, the relation between temperature and sun-spots which he obtained might probably be reversed. WILLIAM J. S. LOCKYER.

Solar Physics Observatory, South Kensington.

Fictitious Problems in Mathematics.

ON reference to § 156 of "Rigid Dynamics," it will be seen that the definition there given is identical with that contained in Dr. Routh's letter of May 25, with the exception that the words "When the bodies . . ." occur in my edition instead of "When bodies . . . ." No statement is made as to what is meant by saying that *a body* is perfectly rough, and it is against this latter mode of expression that my attack is directed. For this reason it may be maintained that the definition given in the book in which the problem occurs is inapplicable to the problem as at present worded. Otherwise we appear to be dealing with a plank such that in the given circumstances, one of which is resting on a smooth table, the amount of friction necessary to prevent sliding can certainly be called into play, and this is apparently inconsistent with Dr. Routh's interpretation.

I would challenge your correspondent, "An Average College Don," to point to any text-book containing an explicit definition of *a* perfectly rough *body* (not *bodies*); also *a* perfectly smooth *body*. If he succeeds, I anticipate no difficulty in furnishing him with examples of questions which are either inconsistent with his definition, are ambiguously worded, or are open to some equally serious objection. G. H. BRYAN.

History of a White Rhinoceros Skull.

THE interesting specimen of the skull of the white rhinoceros (*R. simus*) referred to by Prof. H. F. Osborn, of the American Museum of Natural History, New York, in NATURE of June 8 (p. 127), was, thanks to the kindness of Mr. Graham, carefully examined by me before its sale. Its chief interest lay in the fact that the horns had never been detached, and consequently showed the true position of the nasal horn in this species; it was at right angles to the downward sloping surface of the nasal bones, thus bringing it into a most efficient position for attack.

There is a fine skull of this species in which the horns have been placed in their true position; it is numbered 2154 in the osteological series of the Museum of the Royal College of Surgeons. The animal was shot by Gordon Cumming.

The length of the nasal horn is 860 mm. (34 inches).

C. STEWART.